

BI0059 / **BIOLOGICAL / Infectious Diseases (Human and Animal)**

Dengue (Human)

Definition

Dengue is a mosquito-borne disease that is caused by a virus of the Flaviviridae family and transmitted by female mosquitoes mainly of the species *Aedes aegypti* and, to a lesser extent, *A. albopictus* (WHO, 2020).

Reference

WHO, 2020. Dengue and severe dengue. World Health Organization (WHO). www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue

Annotations

Synonyms

Break Bone Fever.

Additional scientific description

Dengue is a mosquito-borne viral disease that is transmitted by female mosquitoes mainly of the species *Aedes aegypti* and, to a lesser extent, *A. albopictus*. These mosquitoes are also vectors of chikungunya, yellow fever and Zika viruses. Dengue is widespread throughout the tropics, with local variations in risk influenced by rainfall, temperature, relative humidity and unplanned rapid urbanisation (WHO, 2020).

Dengue is a severe, flu-like illness that affects infants, young children and adults, but seldom causes death. Symptoms usually last for 2–7 days, after an incubation period of 4–10 days after the bite from an infected mosquito. The World Health Organization (WHO) classifies dengue into two major categories: dengue (with / without warning signs) and severe dengue. The global incidence of dengue has grown dramatically in recent decades and about half of the world's population is now at risk. There are an estimated 100–400 million infections each year (WHO, 2020).

Dengue causes a wide spectrum of disease, ranging from subclinical disease (people may not know they are even infected) to severe flu-like symptoms in those infected. Although less common, some people develop severe dengue, which can be any number of complications associated with severe bleeding, organ impairment and/or plasma leakage. Severe dengue has a higher risk of death when not managed appropriately. Severe dengue was first recognised in the 1950s during dengue epidemics in the Philippines and Thailand. Today, severe dengue affects most Asian and Latin American countries and has become a leading cause of hospitalisation and death among children and adults in these regions (WHO, 2020).

Dengue is caused by a virus of the Flaviviridae family and there are four distinct, but closely related, serotypes of the virus that causes dengue (DENV-1, DENV-2, DENV-3, DENV-4). Recovery from infection is believed to provide lifelong immunity against that serotype. However, cross-immunity to the other serotypes after recovery is only partial, and temporary. Subsequent infections (secondary infection) by other serotypes increase the risk of developing severe dengue (WHO, 2020).

Dengue has distinct epidemiological patterns, associated with the four serotypes of the virus. These can co-circulate within a region, and indeed many countries are hyper-endemic for all four serotypes. Dengue has an alarming impact on both human health and the global and national economies. Dengue virus is frequently transported from one place to another by infected travellers; when susceptible vectors are present in these new areas, there is the potential for local transmission to be established (WHO, 2020).

The incidence of dengue has grown dramatically around the world in recent decades. A vast majority of cases are asymptomatic or mild and self-managed, and hence the actual numbers of dengue cases are under-reported. Many cases are also misdiagnosed as other febrile illnesses (WHO, 2020).

This alarming increase in case numbers is partly explained by a change in national practices to record and report dengue to the Ministries of Health, and to the WHO. But it also represents government recognition of the burden, and therefore the pertinence to report dengue disease burden. Therefore, although the full global burden of the disease is uncertain, this observed growth only brings a closer recognition to a more accurate estimate of the full extent of the burden (WHO, 2020).

The WHO recommends three methods of dengue surveillance: epidemiological surveillance, vector surveillance and monitoring behavioural impact (WHO, no date).

Metrics and numeric limits

There was a more than 8-fold increase in the number of dengue cases reported to the WHO over the past two decades, from 505,430 cases in 2000, to over 2.4 million in 2010, and 4.2 million in 2019. Reported deaths between 2000 and 2015 increased from 960 to 4032 (WHO, 2020).

Key relevant UN convention / multilateral treaty

International Health Regulations (2005), 3rd ed. (WHO, 2016).

Examples of drivers, outcomes and risk management

Drivers: one modelling estimate indicates 390 million dengue virus infections per year (95% credible interval 284–528 million), of which 96 million (67–136 million) manifest clinically (with any severity of disease). Another study on the prevalence of dengue estimates that 3.9 billion people are at risk of infection with dengue viruses. Despite a risk of infection existing in 129 countries, 70% of the actual burden is in Asia with explosive outbreaks occurring (WHO, 2020).

Vaccination: The dengue vaccine, Dengvaxia® (CYD-TDV) has been shown to be efficacious and safe in persons who have had a previous dengue virus infection (seropositive individuals), but carries an increased risk of severe dengue in those who experience their first natural dengue infection after vaccination (seronegative individuals). As such, the WHO recommends pre-vaccination screening for countries considering vaccination as part of their dengue control programme (WHO, 2019). With this strategy, only persons with evidence of a past dengue infection would be vaccinated (WHO, 2020).

Dengue prevention and control depends on effective vector control measures. Sustained community involvement can improve vector control efforts substantially. There is an ongoing need to adhere to other disease preventive measures such as well-executed and sustained vector control using the WHO Integrated Vector Management (IVM) approach, which is a rational decision-making process for the optimal use of resources for vector control (WHO, 2019). Recently some countries have successfully lowered the incidence of arboviral infections such as dengue through vector control with Wolbachia infection of mosquitoes that decreases their ability to transmit arboviruses.

The WHO responds to dengue in the following ways: supports countries in the confirmation of outbreaks through its collaborating network of laboratories; provides technical support and guidance to countries for the effective management of dengue outbreaks; supports countries to improve their reporting systems and capture the true burden of the disease; provides training on clinical management, diagnosis and vector control at the country and regional level with some of its collaborating centres; formulates evidence-based strategies and policies; supports countries in the development of dengue prevention and control strategies and adopting the Global Vector Control Response (2017–2030); reviews the development of new tools, including insecticide products and application technologies; gathers official records of dengue and severe dengue from over 100 Member States; and publishes guidelines and handbooks for surveillance, case management, diagnosis, dengue prevention and control for Member States (WHO, 2020).

References

WHO, no date. Dengue Control: Monitoring and evaluation of programmes. World Health Organization (WHO). www.who.int/denguecontrol/monitoring/en Accessed 3 November 2020.

WHO, 2016. International Health Regulations (2005), 3rd ed. World Health Organization (WHO). www.who.int/ihr/publications/9789241580496/en Accessed 3 October 2020.

WHO, 2019. Integrated Vector Management. World Health Organization (WHO). www.who.int/neglected_diseases/vector_ecology/ivm_concept/en Accessed 13 April 2021.

WHO, 2020. Dengue and severe dengue. World Health Organization (WHO). www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue Accessed 3 November 2020.

Coordinating agency or organisation

World Health Organization.